Printed Pages : 4 TCS-504

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1076 Roll No.

B. Tech.

(SEM. V) EXAMINATION, 2007-08

PRINCIPLES OF PROGRAMMING LANGUAGES

ne : 3 Hours] *[Total Marks : 100*

Note : *(i) Choose language of your choice to write programs if not mentioned.*

(ii) Assume values, but not impose any property not mentioned explicitly.

Attempt any **four** parts of the following : 5×4=20

(a) What are the general characteristics of programming languages ? Explain each.

(b) (i) What makes a good programming language ?

(ii) What are external influencing factors of programming languages ?

(c) What do you understand by binding and binding time ? What is the difference between binding at compile time and binding at execution time ? Take an expression of a language and discuss various types of binding done for this statement.

(d) Write a statement in a language of your choice, list the various bindings that are necessary to completely determine the semantics of the statement when it is executed.

(e) What are the general syntactic criteria of a programming language ? Explain.

(f) Explain the terms :

(i) Translators

(ii) Software simulation.

2 Attempt any **four** parts of the following : **5×4=20**

(a) Explain the terms variables, constants and literals for a language.

(b) Describe any attributes for an elementary data type that a data object of that type may have other than its data type.

(c) For a language of your choice, find an example of a primitive operation that is undefined for some data objects in its specified domain. Also discuss the criteria for implementation of operations.

(d) When and why dynamic type checking and static type checking operation are performed ? Give major advantages using type checking operations.

(e) Explain the following terms with three examples for each :

(i) Programmer - constructed data object

(ii) System-defined data object.

(f) Write a program for your choice, give a complete specification of the arguments and results of each sub program. Include implicit arguments in the specification. Are any of them undefined for some arguments in the domain you specified ?

3 Attempt any **two** parts : **10×2=20**

(a) What will be syntax and semantic for the following expression ?

Expression : a*b ^ 2 + c / d - e * fun(y)

Disucss about side effects problem for the above expression.

(b) Consider the following program. Give the three numbers printed in the case Y is transmitted to P :

(i) by value
(ii) by reference
(iii) by value - result
(iv) by name.

```
main (  )
var Y : integer
Procedure P ( Y : int);
  begin
    X = X + 1;
    printf (X,Y)
    end;
  begin
    Y = 2;
    P(Y);
    Printf(Y);
    end.
```

(c) Suppose that you wished to design a language that used :

(i) retained local environments.
(ii) no recursive subprogram calls and
(iii) non-local references based on dynamic scope.

Explain how the referencing environment is represented. Explain the actions taken on subprogram call and return. Explain how nonlocal referencing is implemented.

4 Attempt any **two** of the following : **10×2=20**

(a) Analyze the storage management techniques used in a language implementation. Consider the various elements requiring storage management.

(b) The strking features of a garbage collection as a method of storage recovery is that its cost is inversely proportional to the amount of storage recovered. When a program is just about to run out of storage altogether, it often performs a series of lengthy and costly garbage collections before it terminates altogether. Give a method for avoiding repeated useless garbage collections of this sort.

(c) Explain the following terms :

(i) Heap storage management

(ii) Stack-based storage management

(iii) Static storage management.

5 Attempt any **two** parts : **10×2=20**

(a) (i) How does the C++ model for exceptions differ from the Java model ?

(ii) Is C++ an object-oriented language ? Explain.

(b) Write notes on the following terms :

(i) Lambda calculus

(ii) Data flow language

(iii) Object-Oriented Language.

(c) (i) Why are private parts of a superclass generally not made accessible to subclasses ?

(ii) Can we have inheritance without polymorphism ? Explain.